# WHEEL POSITIONAL RESTRAINT DEVICE AND METHOD FOR USING THE SAME

## FIELD OF THE INVENTION

**[0001]** The invention relates to leveling devices for vehicles, especially large, recreational vehicles and trailers.

## BACKGROUND OF THE INVENTION

**[0002]** Recreational vehicles must be maintained in a level, horizontal position when parked in order to ensure comfort and proper operation of appliances, tables, and the like. Examples of ramp leveling devices can be found by a review of Blatz, et al., U.S. Patent 5,328,154, commonly assigned; Blatz, et al., U.S. Patent 5,458,315, commonly assigned; and Redfern, U.S. Patent Des. 426,933. The disclosures of U.S. Patents 5,328,154 and 5,458,315 are incorporated by reference herein.

**[0003]** It is not only desirable for a leveler assembly to lift and support a wheel of a recreational vehicle but it is often additionally desirable to restrain movement of a wheel of a recreational vehicle in a first given direction. A vehicle wheel positional restraint is advantageous for two separate reasons. First, a vehicle wheel positional restraint will give feedback to a vehicle operator that the wheel has reached a position upon the leveler assembly that the person desires. Second, the wheel positional restraint restrains movement of the vehicle wheel after the vehicle has been parked. Examples of patents which illustrate leveler assembly devices with wheel restraints can be found in Franklin, U.S. Patent 4,427,179 and Rogers, U.S. Patent 3,752,441.

**[0004]** It is desirable to provide an apparatus and method of utilization thereof of a vehicle wheel positional restraint which can be utilized with ramp leveler devices similar to those found in Blatz, et al., U.S. Patent 5,328,154, Blatz, et al., U.S. Patent 5,458,315, and Redfern, U.S. Patent Des. 426,933.

## SUMMARY OF THE INVENTION

**[0005]** In a preferred embodiment the present invention brings forth a vehicle wheel positional restraint useful in a wheel support leveler assembly. The assembly includes a first

planar body having upper and lower surfaces with pins extending from spaced locations similar to those mentioned in the Blatz, et al. patents. The vehicle wheel positional restraint in a preferred embodiment includes a body having a lower surface with pin engaging pockets to receive pins of planar bodies in a non-interfering interlocking manner. The vehicle wheel positional restraint has an upper surface with an obstruction at an extreme end to prevent movement of the vehicle in a first given direction. The vehicle wheel positional restraint also in such preferred embodiment has a portion for overlapping one planar body with pockets for engaging pins of such planar body. The vehicle wheel positional restraint additionally will have a heel portion having pin engaging pockets for engaging a second planar body laterally positioned with respect to the first planar body. The second planar body is stacked at a different vertical height.

**[0006]** The combined assembly of the planar bodies and the vehicle wheel positional restraint cooperate to lift, support and additionally restrain the position of the vehicle wheel in a first given direction.

**[0007]** The above-noted features and advantages of the present invention will be further realized by those skilled in the art from a review of the invention as provided in the accompanying drawings and detailed description.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0008]** Figure 1 is a perspective view of a plurality of leveler units to lift and support, and level a vehicle.

**[0009]** Figure 2 is a perspective view of one unit of Figure 1.

**[0010]** Figure 3 is a top plan view of the unit of Figure 2.

**[0011]** Figure 4 is a side elevation view of the unit of Figure 2.

**[0012]** Figure 5 is a perspective view of an alternative embodiment of leveler unit.

**[0013]** Figure 6 is a top plan view of the unit of Figure 5.

**[0014]** Figure 7 is a top plan view of a leveler unit having a sixteen-pin design.

[0015] Figure 8 is a side elevational view of the leveler unit shown in Figure 7.

[0016] Figure 9 is a bottom plan view of the leveler unit shown in Figures 7 and 8.

[0017] Figure 10 is a side elevational view of a wheel support leveler assembly according to the present invention.

[0018] Figure 11 is a rear perspective view of the positional restraint shown in Figure 10.

[0019] Figure 12 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

[0020] Figure 13 is a rear perspective view of the wheel support leveler assembly shown in Figure 12.

[0021] Figure 14 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

[0022] Figure 15 is a rear perspective view of the wheel support leveler assembly shown in Figure 14.

[0023] Figure 16 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

[0024] Figure 17 is a rear perspective view of the wheel support leveler assembly shown in Figure 16.

[0025] Figure 18 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

[0026] Figure 19 is a rear perspective view of the wheel support leveler assembly shown in Figure 18.

[0027] Figure 20 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0028]** Figure 21 is a rear perspective view of the positional restraint utilized in Figure 20.

**[0029]** Figure 22 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0030]** Figure 23 is a rear perspective view of the wheel support leveler assembly shown in Figure 22.

**[0031]** Figure 24 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0032]** Figure 25 is a rear perspective view of the wheel support leveler assembly shown in Figure 24.

**[0033]** Figure 26 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0034]** Figure 27 is a rear perspective view of the wheel support leveler assembly shown in Figure 26.

**[0035]** Figure 28 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0036]** Figure 29 is a rear perspective view of the wheel support leveler assembly shown in Figure 28.

**[0037]** Figure 30 is a side elevational view of an alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0038]** Figure 31 is a side elevational view of another alternate preferred embodiment wheel support leveler assembly according to the present invention.

**[0039]** Figures 32 and 33 are upper and lower perspective views of the positional restraints shown in Figures 16 and 17.

**[0040]** Figures 34 and 35 are upper and lower perspective views of the positional restraints shown in Figures 26 and 27.

## DETAILED DESCRIPTION OF THE INVENTION

**[0041]** Figure 1 illustrates a plurality of units 2 supporting a wheel 4 of a recreational vehicle or the like, for leveling purposes. As shown in more detail in Figures 2-4, the units 2 have a planar body preferably substantially square in shape circumscribed by edges 6. Extending upwardly from equally spaced locations in the upper surface 8 of the generally planar unit 2 is a plurality of pins 10. The pins 10 have a circumferential surface 11. It should be noted that, as used herein, circumferential refers to any outer perimeter and is not limited to conical or circular shapes. These pins 10 are of equal shape and size, and are aligned in rows parallel to the edges 6 of the unit. The equal spacing of the pins 10 promotes their ability to matably receive and interlock with appropriately located pin engaging pockets 12 in a bottom surface of other similar units 2. Each pin 10 is located with respect to its adjacent pins 10 a distance twice the distance between that pin 10 and its adjacent edges.

**[0042]** In the embodiment shown in Figures 2-4, the pins 10 are of truncated conical shape, and are slightly smaller than the pockets 12. The pockets 12 are contoured similarly to the pins. In this configuration, a loose engagement is maintained between the pins 10 and the corresponding pockets 12 of other units so that slight relative movement is permitted of the pins 10 while remaining within the respective pockets 12.

**[0043]** In the embodiment shown in Figures 1-4 the pins 10 possess bases 14 of a slightly larger transverse cross sectional area than their tops 16. The sides of the pins slope marginally outwardly from their tops 16 towards their bases 14.

**[0044]** The lower surfaces 18 of each unit 2 (Figure 4) comprise a plurality of pockets 12 which extend into the said lower surface 18. The pockets 12 are of similar shape and size and are also equally-spaced throughout the lower surface of the planar body of the unit so as to be located directly beneath corresponding pins 10. The pockets 12 are slightly larger than the pins 10 so that when engaged, the pins 10 (and their respective unit) are capable of limited lateral relative movement with respect to another unit's pockets 12. The aforementioned limited lateral movement is intended to facilitate self-stabilization and adjustment of the units 2 when a plurality of the units 2 is combined for operation. Since a clearance is provided about the entire portion of the circumferential surface 11 of the pin 10,

an interference fit between the pin 10 and a corresponding pocket 12 is prevented. The clearance also facilitates disassembly of the units 2 after usage.

**[0045]** The plurality of units 2 is capable of association by means of an engagement between the pins 10 of one unit 2 and the pockets or recesses 12 of another unit 2. This pin/pocket association permits the individual units to be utilized in combination, thus forming a leveling assembly device of a variety of widths and heights.

**[0046]** In an alternative embodiment illustrated in Figures 5 and 6, the pins 30 of the units 31 are of a polygonal shape of an octahedral in transverse cross-section, again preferably having sides 32 which are outwardly sloped from top 33 to bottom 34. The units 31 are similarly square in shape, and are bound at their perimeters by inwardly sloping edges 35, these edges tapering from bottom 37 to top 37. In this embodiment, the pockets 38 are of corresponding shape, and slightly larger than the pins 30 so that a loose engagement is maintained when the pins 30 of one unit 31 are received by the corresponding recesses or pockets 38 of an upper unit 31. In this embodiment while the body of the units 31 is similarly generally planar, it is composed not of continuous material but rather of a discontinuous webbing 39 containing a plurality of apertures 40 which extend between the upper and lower surface of the body of the unit 31.

**[0047]** As shown in Figure 1, units 2/31, alone or in combination with other such units 2/31, provides a means for leveling and supporting recreational and other vehicles by providing a surface at a variety of potential heights upon which the wheels 4 of the vehicle can be mounted and rest. The pins 10/30 extend from the upper surface 8/36 into a corresponding pocket 12/38 providing stability to the wheels 4 when mounting. The pin 10/30, pocket 12/38 interface and maintain the position of the leveler units 2/31 against lateral or longitudinal displacement (beyond a small limited amount).

**[0048]** The number of units 2/31 required is dictated by the number of vehicle wheels 4 requiring support and the height required to be provided for each of said wheels. In most applications it is preferable to have the units 2/31 form a base or lower level 17 with units 2/31 positioned adjacent to one another with the pins 10/30 extending upwardly (Figure 1). An upper level 19 is then formed by placing one or more units 2/31 onto the lower level 17 by engaging pins 10/31 at an "offset" so that the pockets 12/38 of an upper level unit 2/31 receive the pins 10/30 of two units 2/31 from the lower level 17. This process can be repeated, thus forming a leveler assembly 15 at a desired height. When formed, the leveler

assembly 15 provides dual step-type ramped edges permitting the vehicle's wheels to mount from and descend from, either side of the leveler assembly 15.

**[0049]** Further facilitating the wheel's 4 ability to mount onto the leveler assembly 15 is the sloped shape of the units 2/31 perimeter edges 6/35. These perimeters, having slightly wider bases than upper surfaces, provide a small, preliminary ramp onto which the vehicle's wheels may mount.

**[0050]** The leveler units 2/31, when formed to the desired height for lifting and/or leveling a vehicle, are to be placed in front of or behind any number of the vehicle's wheels 4. The vehicle is then driven slowly up onto the assembly 15 so that the vehicle's wheels 4 are mounted thereon. During the mounting of the wheels 4, the shape of the perimeter edges 6 and the loose engagement of the pins 10/30 and pockets 12/38 allow the leveler assembly 15 to adjust to the tremendous weights, while preventing the stacked units 2/31 from tipping during initial contact of the wheels 4 with the leveler assembly 15. During mounting, the pin 10/30, pocket 12/38 engagement allows for slight relative movement therebetween allowing the leveler assembly 15 to adjust itself while preventing the units 2/31 of corresponding different levels 17, 19 becoming inseparably bound to each other. Further, the pins 10/30 extend upwardly from the upper surfaces 8 and are exposed to the wheels 4 of the vehicle during mounting, thus providing a surface that reduces the possibility of slipping between the upper surface 8/36 and the wheels 4.

**[0051]** When dismounting the leveler assembly 15, the process is essentially similar but operated in reverse, with the vehicle being able to dismount by travelling in the opposite direction. The loose pin/pocket 10/30, 12/38 engagement allows the units 2/31 to be easily separated.

**[0052]** Referring to Figures 7-9, an alternate unit 41 is provided. The unit 41 has generally square pins 42 that extend from its upper surface 44. The pins have a circumferential surface 45. Along a portion of circumferential surface 45 of the pins which is adjacent to one another, the pins 42 have a quarter circular depression 48 formed therein. The upper surface 44 of the unit 41 provides a continuous barrier similar to the units 2 shown in Figures 1-4. The units 41 have a lower surface 50 which abuts the upper surface 44 when the units 41 are stacked upon one another. When stacked upon one another, the units 41 have limited relative lateral movement with respect to one another as previously described for units 2/31, shown in Figure 1-6. The 4 x 4 general design of the unit 41 allows the unit 41 to have sixteen pins. The unit 41 has pockets 54 to receive the pins 42 in a

manner as previously described. The pockets 54 have position-limiting ribs 58 adjacent thereto.

**[0053]** Referring to Figures 10-11, a wheel support leveler assembly 77 to lift, support and restrain a position of a vehicle wheel is provided. The assembly 77 has an array of leveler units 60 similar to those described for Figures 5 and 6. The leveler units 60 have pins 62. The pins 62 are associated with corresponding pockets 64 that intersect the lower surfaces 66 in a manner as previously described. Positionally stacked on two of the leveler units 60 in an overlapping manner is a vehicle wheel positional restraint 70. The positional restraint 70 has an upper surface 72. The upper surface 72 has projecting therefrom pins 74. At an extreme end 78 the positional restraint has an obstruction 80 on its upper surface. The obstruction 80 as shown is shaped as a ramp having a curvilinear surface 82 having a non-constant increasing radius of curvature thereon going towards its extreme end 78. The positional restraint 70 has a lower surface 86. The lower surface 86 is intercepted by pin receiving pockets similar or identical to pockets 64 for receipt of corresponding pins 62 of the underlying units 60. The positional restraint 70 hinders movement of the wheel towards a first given direction or to the right as shown in Figure 10. The positional restraint 70 additionally alerts a vehicle operator that the vehicle wheel 4 has reached the desired position on the leveler assembly 77.

**[0054]** Referring to Figures 12-13, a wheel support leveler assembly 107 is provided. The assembly 107 has a positional restraint 110. Positional restraint 110 has an upper surface 112 having a generally planar portion 114 which blends into a generally constant radius ramp obstruction portion 116. An under surface 120 of the positional restraint 110 has rear pockets 64 generally as previously described. Additionally, the planar portion 114 has pockets 121 provided by apertures that allow the octagonal pins 62 of the underlying units 60 to extend generally therethrough. An upper surface 122 of the pins is generally at a level adjacent to the top surface of the planar portion 114.

**[0055]** Referring to Figures 14-15, a wheel support leveler assembly 127 is provided. The assembly 127 is provided with leveler units 60 generally as previously described. Additionally, the assembly 127 has a positional restraint 130. Positional restraint 130 is generally approximately 50% longer than the underlying units 60. The positional restraint 130 has a lower surface 132 which is intersected by a row of pockets 64 and two rows of pockets 121. The positional restraint 130 has interconnection with six of the pins 62 of the underlying two leveler units 60. The positional restraint 130 would typically be more

desirable with larger recreational vehicles providing enhanced stability over positional restraints 70 and 110.

**[0056]** Referring to Figures 16, 17, 32 and 33, a vehicle support leveler assembly 157 is shown, having a vehicle wheel positional restraint 160. The positional restraint 160 has a planar portion 162. The planar portion 162 has apertures 121 to provide a pocket for underlying pins 62 as previously described. Additionally, the positional restraint 160 has a heel 164 and a row of pockets 64 as previously described. The positional restraint 164 accordingly not only mates with pin 62 of the top layer of units 60 but also mates with a pin 62 of a bottom layer of units 60. The two mated units 60 are laterally adjacent to one another as well as at different vertical heights. The above noted arrangement typically gives an enhanced stability. In the absence of an underlying layer of units 60, the positional restraint 160 will allow the heel portion to contact the ground or underlying surface.

**[0057]** Referring to Figures 18-19, a wheel support leveler assembly 177 is provided having a positional restraint 179. The positional restraint 179 is similar to positional restraint 160 having a heel 181 with corresponding pockets 64. Additionally, positional restraint 179 is approximately 50% greater in length than positional restraint 160 and has a planar portion 183 having two rows of apertures 121 to provide for pockets for underlying pins 64. It has been found that this assembly provides an extreme amount of stability for the positional restraint.

**[0058]** Referring to Figures 20-21, a wheel support leveler assembly 207 with a positional restraint 208 is provided. The leveler assembly 207 is similar to that described for assembly 77 with the exception that the leveler units 41, pins 42 and associated pockets 54 are identical or similar to those described in Figures 7-9.

**[0059]** Referring to Figures 22-23, a wheel support leveler assembly 217 is provided having a positional restraint 218. The function and operation of the assembly 217 is similar to assembly 107 with the exception that leveler units 41, pin 42 and associated pockets 54 are similar to that described in relationship to Figures 7-9.

**[0060]** Figures 24-25 illustrate a wheel support leveler assembly 227 having a vehicle wheel positional restraint 228 similar in form and structure to that aforedescribed in relationship to assembly 127 with the exception that the leveler units 41, pins 42 and associated pockets 54 are similar to that described in relationship to Figures 7-9.

**[0061]** Figures 26-29 and 34-35 bring forth wheel support leveler assemblies 227 and 247 with positional restraints 238 and 248 which are both similar to aforedescribed assemblies 157 and 177, with the exception that leveler units 41, pins 42 and associated pockets 54 are similar to that described in relationship to Figures 7-9.

**[0062]** Referring to Figure 30, wheel support leveler assembly 257 is provided. The wheel support leveler assembly 257 has a positional restraint 258 which is substantially similar to the positional restraint 218 mentioned previously in Figures 23-24. However, positional restraint 258 has a ramp obstruction surface 260 which has a declining radius of curvature as the ramp surface 260 proceeds towards an extreme end 262 of the positional restraint.

**[0063]** Figure 31 brings forth a wheel support leveler assembly 267 with a positional restraint 268. The positional restraint 268 has an upper surface with a generally planar portion 270 which intercepts a generally straight line ramp obstruction 272. Additionally, the positional restraint 268 has a heel 274.

**[0064]** Typically the positional restraints will be fabricated from like material utilized for the leveler units.

**[0065]** While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the invention.